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RTFMs #5: Building a Vacuum Pump

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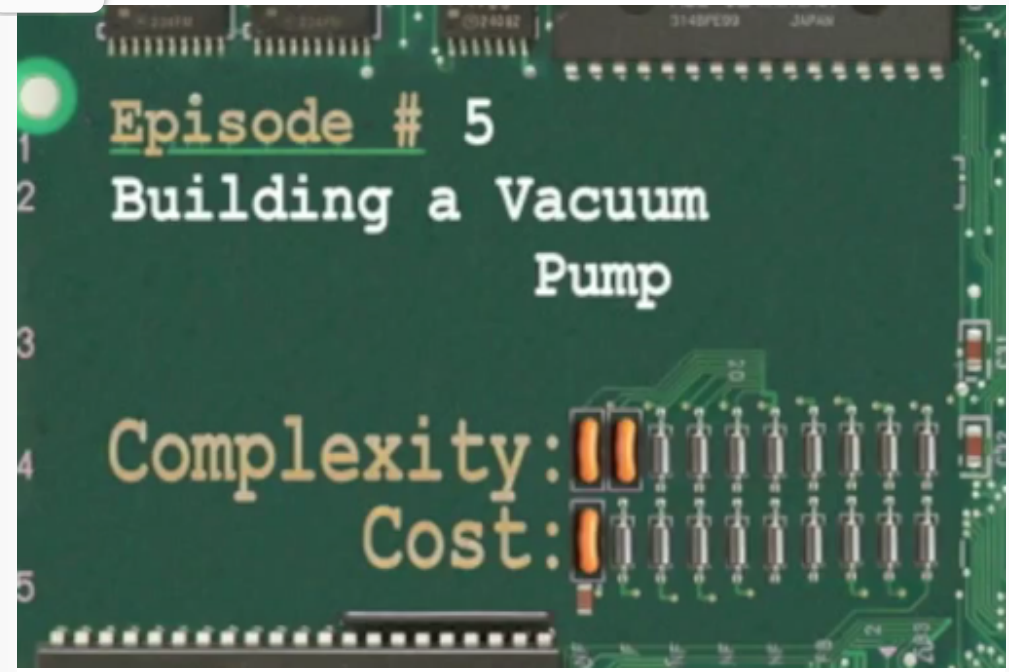

RTFMs Episode 5: Building a Vacuum Pump

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Building a vacuum pump once was easy. You just get a bicycle pump like this one and reverse the rubber seal at the end of the plunger.

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Rubber Seal: Old Style

Modern pumps have a different construction and reversing them is a bit more complicated than it was before. Let's take this pump apart and see what's inside.

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Let me remove the top cover of the barrel. In this particular pump it is secured with two screws which I already took out. The top cover gets off easily and I'm removing the plunger. It's a good idea to have bunch of paper towels nearby to wipe out tons of grease from the plunger.

I'm a huge fan of science and technology doing my part in sharing knowledge about this world and how it works. With some time and patience I'm hoping to achieve something that will change it for the best.

Removing Plunger

So the grease is removed, we can see the seal and it looks non-reversible. There is just no thru hole. Well, let's make it!

No Through Hole == No Reverse

I don't want to damage the o-ring, so I'm removing it first. Next goes this nut which doesn't really secure anything. Unscrewing the plastic piston was the least trivial part that required good amount of brute force, vice and pliers. Well, let me pretend that was easy.

Remove O-Ring

While drilling the hole I don’t want to ruin the threading which I still need. So I’m making a small hole with Dremel and then make it larger already knowing where to drill from the blind side.

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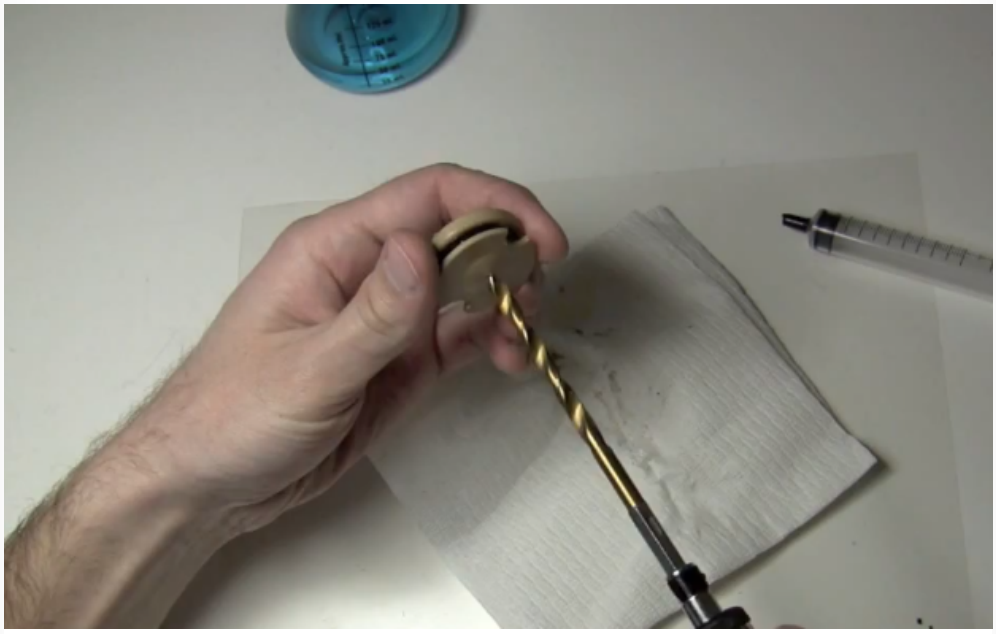
Drill a Small Hole in the Center with Dremel so Threading Stays Intact

Once we know that we can make the hole larger by using a larger bit and drilling from the blind side. Make sure you don't ruin the threading!



Make Hole Larger and do not Ruin the Threading

Let's screw the piston to the plunger and check if the threading is in place and the hole is good to screw the piston in reversed orientation. Yeap, it is!

Test if the Hole Fits the Plunger by Screwing it All the Way Through

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Now I can attach the piston in reversed position, put the o-ring back and apply a lot of grease. To install the plunger back into the barrel first insert it maintaining 45 degree angle and then push it inside. Finally lets put the top cover back and secure it.

Put the Plunger Back in the Barrel

Our pump is almost ready, but we need one more very important component: the vacuum chamber. It has to be transparent so we can see what's inside. Its walls need to be thick. So for instance plastic bottles won't work. It also has to be small as the smaller it is the lower pressure will be able to produce. I was lucky to snatch this acrylic jar in Target and it perfectly fits the requirements. This glass jar will also make a great vacuum chumber once I'm done with jam in it.

Choose the Vacuum Chamber

To attach the pump to the chamber I unscrewed the head from the hose. (You can actually simply cut it out). Than I drilled a hole in the jar cap that

Chewing Gum and Drinking Straw

It worked surprisingly well, though later I redid it with aluminum pipe and hot glue to make it more permanent.

Aluminum Pipe and Hot Glue

So here is our vacuum pump and chamber. You can use it to squash plastic bottles or inflate marshmallows. In the following episodes I'll show how to use it in a more scientific manner.

Squashing Plastic Bottles

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